DECEMBER 2000 EPA 909-R-00-002

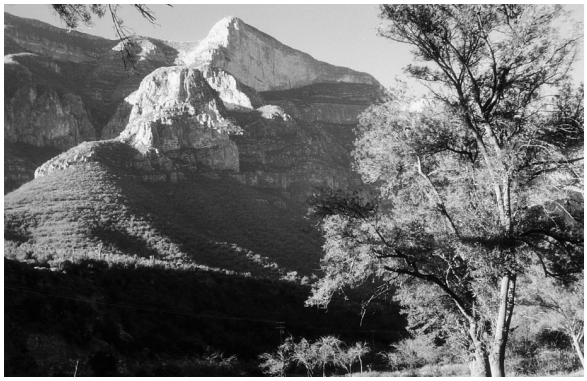
SUMMARY OF SELECTED ENVIRONMENTAL INDICATORS

FROM THE U.S.–MEXICO BORDER XXI PROGRAM: PROGRESS REPORT 1996–2000

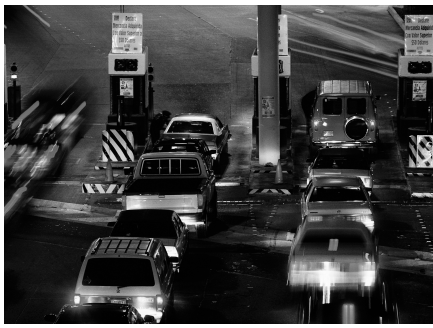
EPA

SEMARNAP

Environmental indicators serve as a fundamental tool to measure the state of the environment and changing environmental conditions that affect human and ecological health along the border.



In 1997, the first U.S.-Mexico Border Environmental Indicators Report set the foundation for the development of environmental indicators along the border. Each of the nine Border XXI Workgroups identified a series of binational environmental indicators and began the challenging task of collecting key information to assess status and trends in human and ecological health along the border. This year, the Border XXI Workgroups have further refined and developed their indicators, and in some cases have revised some of their original indicators to accommodate evolving border environmental needs and priorities.



Border XXI Workgroups

Workgroups Initiated in 1983

- *Air
- *Contingency Planning and Emergency Response
- *Hazardous and Solid Waste
- *Water

Workgroups Added in 1992

- Pollution Prevention
- *Cooperative Enforcement and Compliance

Workgroups Added in 1996

- Environmental Information Resources
- Natural Resources
- Environmental Health

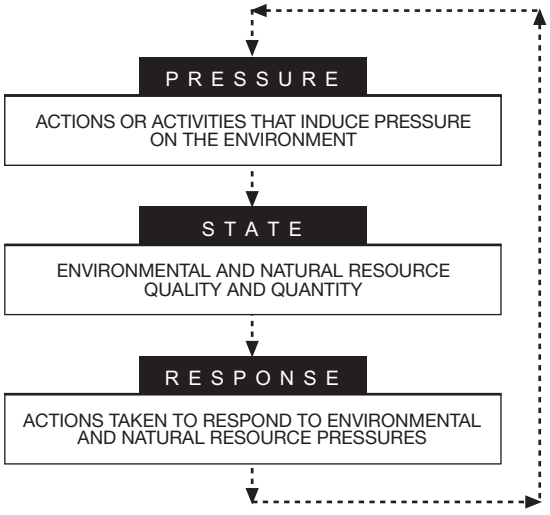
**Workgroup is presented within this publication*

This publication provides a preview of the developments and advancements that have been made to the environmental indicators since their development in 1997. The Border XXI Workgroups presented in this publication were selected primarily because of the significant advances in the development of their indicators. As such, only a subset of the Border XXI Workgroups and indicators are presented in this publication, including:

- Air
- Contingency Planning and Emergency Response
- Cooperative Enforcement and Compliance
- Hazardous and Solid Waste
- Water

All of the Border XXI Workgroups and a comprehensive list of indicators, including a description of each indicator and progress made, can be found in the U.S.-Mexico Border XXI Program: Progress Report 1996–2000 (the "Progress Report").

Types of Environmental Indicators



Please refer to Appendix 1 on environmental indicators of the Progress Report 1996-2000 for a detailed definition of pressure, state, and response indicators.

TYPES OF ENVIRONMENTAL INDICATORS

Each of the indicators presented in this summary and in the Progress Report are organized under a standardized methodology developed by the Organisation for Economic Cooperation and Development (OECD). The OECD framework groups indicators in a pressure-state-response model that can help evaluate environmental and health conditions in the border area more effectively.

All of the Border XXI Workgroups and the comprehensive list of indicators for each workgroup can be found in the U.S.-Mexico Border XXI Program: Progress Report 1996–2000

AIR

The Air Workgroup has focused its efforts in three primary geographic areas: (1) Tijuana, Rosarito, and San Diego County; (2) Mexicali and Imperial County; and (3) Ciudad Juárez, El Paso County, and Doña Ana County. In addition, short- and long-term air quality monitoring and pollutant exposure studies are being conducted in other border cities. The Air Workgroup is also addressing border-wide air quality issues such as border vehicle congestion and the relationship between energy generation and air quality.

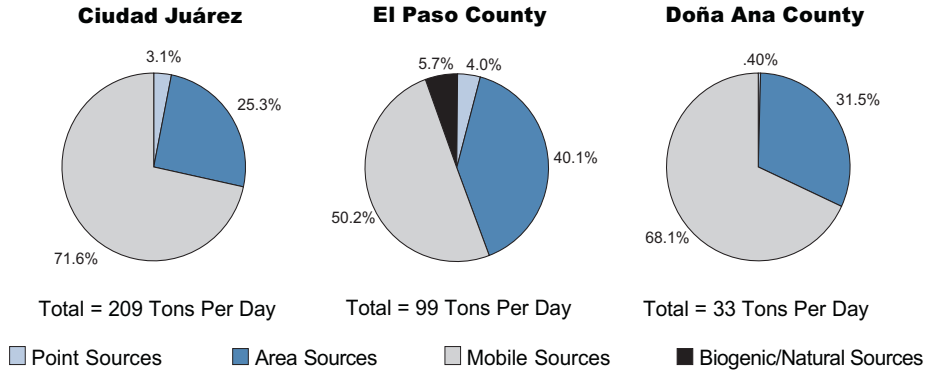
The Air Workgroup has compiled new information from recently completed emission inventories conducted in the Ciudad Juárez, El Paso County, and Doña Ana County air basin as well as Mexicali and Imperial County. In addition, the pollutant concentration indicators for particulate matter (PM10), ozone, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and carbon monoxide (CO) have been updated. Finally, revised information on border cities where pollution levels exceed ambient air quality standards, and the number of exceedance days is presented below and in the Progress Report.

EMISSIONS OF POLLUTANTS — PRESSURE

Emissions inventories are conducted to help determine emission sources (i.e., mobile sources, point sources) and estimate the amount of pollutants emitted by these sources within a given geographic region or air basin. These data provide information on which source types are the greatest contributors to air quality problems.

The data presented here are for volatile organic compound (VOC) emissions in the Ciudad Juárez, El Paso County, and Doña Ana County air basin. The indicator illustrates that more than half of the total VOC emissions in the air basin are attributed to mobile sources (i.e. cars, trucks, buses). Approximately one third of the total VOC emissions are from area sources (i.e. consumer products, auto body paint shops, gasoline stations).

1996 Volatile Organic Compounds (VOC) Emissions Inventory



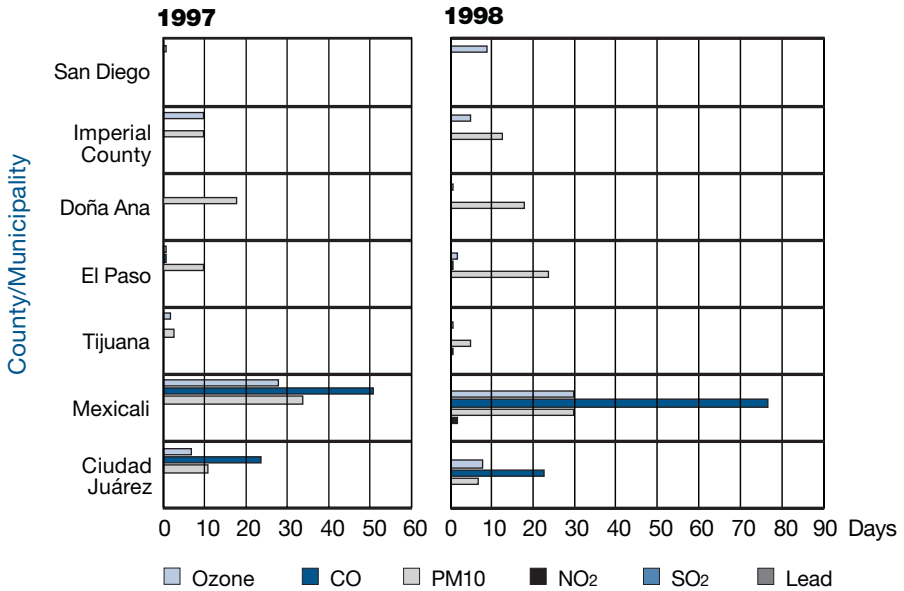
NUMBER OF EXCEEDANCE DAYS FOR EACH AMBIENT AIR STANDARD — STATE

The graphs present a list of border cities and the number of days that each ambient air standard was exceeded in 1997 and 1998. This information helps identify air quality problems in a particular border city in order to focus potential air emissions abatement efforts.

In urban areas, mobile sources are typically the biggest contributor to CO exceedances. The exceedances for PM10 presented in the charts include emissions due to high wind events.

Vehicle emissions and severe traffic congestion at international bridges are major sources of air pollution in border cities. Emissions from industrial sources, residential combustion, and dust from unpaved roads are also significant contributors to poor air quality. A summary of potential human health risks associated with the air pollutants presented here can be found in the Air Workgroup chapter of the Progress Report.

Number of Exceedance Days



• Information for Rosarito was not available at the time of publication

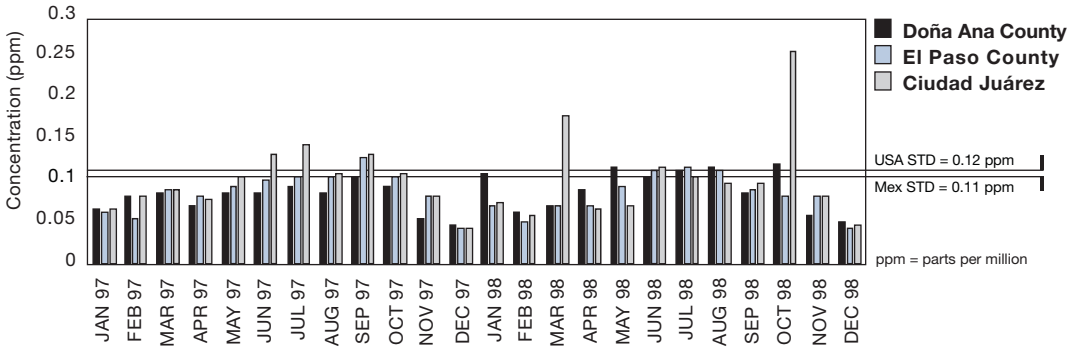
AIR

continued

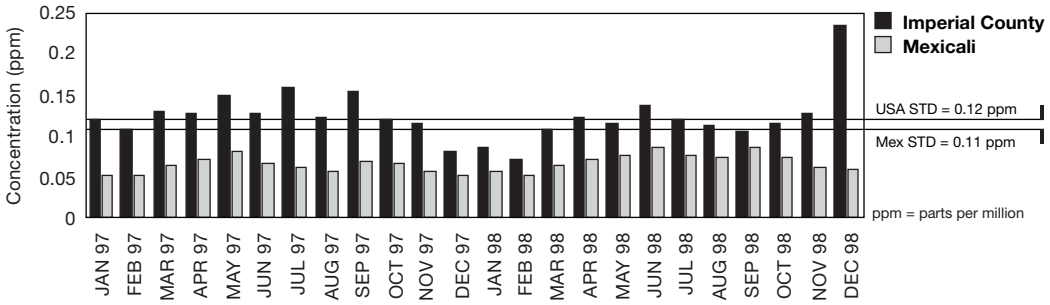
AMBIENT AIR CONCENTRATIONS FOR CRITERIA POLLUTANTS IN EACH SISTER CITY — STATE

The charts below present ambient ozone concentrations taken from a network of monitoring stations in the Ciudad Juárez, El Paso County, and Doña Ana County region and the Mexicali and Imperial County region. These charts illustrate ozone concentrations for the years 1997 and 1998 and provide a visual representation of seasonal variations and annual monthly trends. The comprehensive set of ambient air concentrations for other criteria pollutants and cities can be found in the Progress Report.

Ciudad Juárez, El Paso County, and Doña Ana County
Maximum Monthly 1-Hour Ozone Concentration



Mexicali and Imperial County
Maximum Monthly 1-Hour Ozone Concentration



All of the Border XXI Workgroups and the comprehensive list of indicators for each workgroup can be found in the U.S.-Mexico Border XXI Program: Progress Report 1996–2000

CONTINGENCY PLANNING AND EMERGENCY RESPONSE

The Contingency Planning and Emergency Response Workgroup has focused its efforts on two primary areas: (1) increasing preparation and response capacity for hazardous substances incidents at the local and municipal levels, and (2) implementing the sister city contingency plans to optimize notification systems and the use of resources from both countries.

The Workgroup has presented new information for all of their indicators in the Progress Report; the indicator pertaining to sister cities with contingency plans is presented here.

Sister Cities with Contingency Plans

Brownsville, Texas - Matamoros, Tamaulipas (1997)

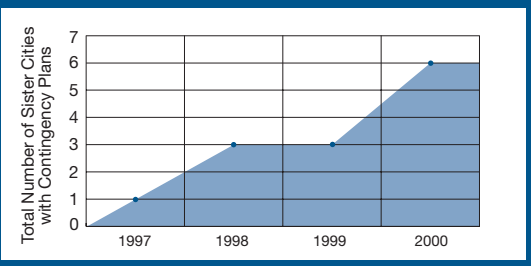
Eagle Pass, Texas - Piedras Negras, Coahuila (1998)

Laredo, Texas - Nuevo Laredo, Tamaulipas (1998)

McAllen, Texas - Reynosa, Tamaulipas (2000)

Nogales, Arizona - Nogales, Sonora (2000)

San Luis, Arizona - San Luis, Sonora (2000)



NUMBER OF SISTER CITIES WITH CONTINGENCY PLANS — RESPONSE

Currently there are six sister cities that have contingency plans in place; the remaining sister cities' contingency plans will be completed over the next several years.

A contingency plan addresses international coordination requirements for responses to emergencies involving hazardous substances. The contingency plan also prepares sister cities for chemical accidents, and helps them to identify ways to reduce risks and prevent such accidents.

COOPERATIVE ENFORCEMENT AND COMPLIANCE

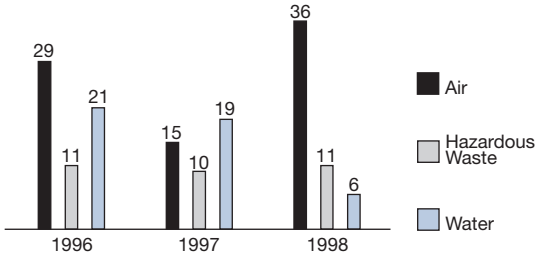
The Cooperative Enforcement and Compliance Workgroup was created to strengthen binational cooperation and to enhance both countries' capacity to enforce and promote compliance with their respective environmental laws. This cooperation aims at resolving mutual environmental problems caused by noncompliance in a way that respects each country's own resources and sovereignty at all times.

The Workgroup has presented new information for all of their indicators to help assess overall performance of environmental enforcement and compliance programs for both countries. The classifications (i.e., Pressure, State, Response) for these indicators have been omitted because they do not lend themselves to the OECD framework for organizing indicators. The indicator pertaining to the number of enforcement actions is presented below.

NUMBER OF ENFORCEMENT ACTIONS AND PENALTIES IN THE BORDER AREA

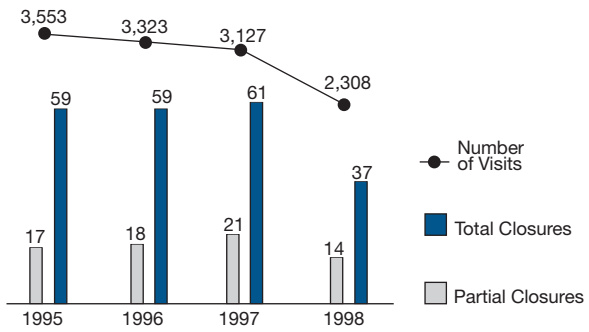
This indicator measures legal actions taken in the border area by the United States and Mexico. Many factors can affect the number of enforcement actions conducted in each country, including the number of facilities to inspect, amount of enforcement resources, and general compliance rates among regulated entities. During the next year, the Workgroup will improve its indicators to better address enforcement and compliance trends in the border area.

Number of Enforcement Actions in the U.S. Border Area



- From 1996 to 1998. EPA took 37 Clean Water Act (CWA) enforcement actions in Texas (the State of Texas had not assumed the CWA Program)

Number of Total or Partial Closures in Mexico's Border Area



- Source: PROFEPA/SEMARNAP 2000 Unidad Juridica de PROFEPA
- A partial closure is an administrative or enforcement action by which a portion of an industrial or tourist project or activity is terminated or suspended. A total closure is an administrative or enforcement action by which an entire industrial or tourist project or activity is terminated or suspended.

HAZARDOUS AND SOLID WASTE

The rapid industrialization and the associated population increase in the border region have created a need for improved hazardous and solid waste management infrastructure. Many of the indicators developed by the Hazardous and Solid Waste Workgroup address progress in the development of such infrastructure. Seven binational environmental indicators were published in 1997; since then the Workgroup has made significant progress in developing and collecting the necessary data to visualize status and trends in hazardous waste management along the border.

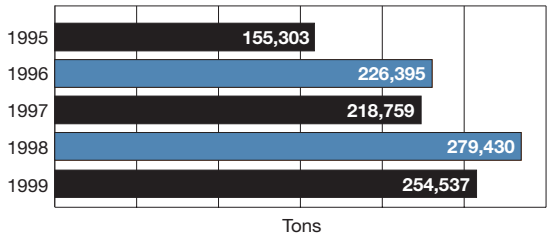
Three of the seven indicators are presented below, with information on the border region's disposal and recycling infrastructure and capacity.

QUANTITIES OF HAZARDOUS WASTE SENT FROM THE UNITED STATES TO MEXICO FOR RECYCLING — RESPONSE

The graph is based on National Institute of Ecology (INE) data and presents a registry of total imports of hazardous waste to be recycled in Mexico. The hazardous wastes imported in greater volume throughout the country are those with a high content of zinc, tin-lead powders and residues, and used automotive batteries.

A number of factors affect the pattern seen in this indicator. One important element is that one single facility, located in Monterrey, Nuevo León, accepts more than half of the total hazardous waste sent to Mexico each year for recycling. This facility recycles electric arc furnace dust from steel mills in the United States. Another factor, which relates to the increasing trend seen in this indicator, is INE's policy of encouraging the development of recycling capacity. As the number of businesses established for recycling hazardous wastes has increased in recent years, more hazardous waste from the United States has been exported to Mexico for recycling.

Hazardous Waste Exported to Mexico for Recycling
(by Mexican definition of hazardous waste)



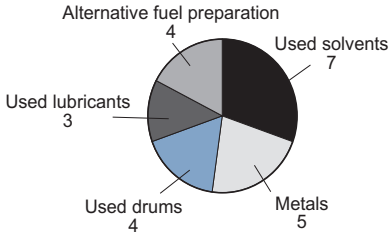
RECYCLING CAPACITY IN THE BORDER REGION — RESPONSE

Twenty-three companies are authorized by INE to recycle hazardous wastes in Mexico's border states: seven recycle used solvents, five process metals, four recondition used drums, three recycle used lubricants, and four provide integrated handling for the preparation of alternate fuel. It is important to note that this information is provided for facilities located throughout Mexico's border states; they are not necessarily exclusively within the 100 kilometer (km) border zone. Within the 100 km border region in the United States, there are two commercial recycling facilities. Of these, one recycles spent solvents and the other recycles both solvents and metals.

There are several reasons why the number of recycling facilities is much higher in Mexico than in the United States. First, as noted above, the data for Mexico reflect the number of recycling facilities in the border states, not just the 100 km border region. Second, with some exceptions, the Mexican side of the border is generally more heavily industrialized. Because of this, there are more service industries, such as hazardous waste recyclers, to address the hazardous waste management needs of industry in the Mexican states. A final reason for this difference is INE's policy, which strongly encourages hazardous waste management companies to develop recycling rather than disposal capacity in order to reduce the amount of hazardous waste that must ultimately be sent for disposal.

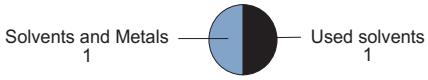
Hazardous Waste Recycling Facilities in U.S. and Mexico
1998

In Mexico Border States



Total: 23

In U.S. Border Region



Total: 2

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HAZARDOUS AND SOLID WASTE

continued

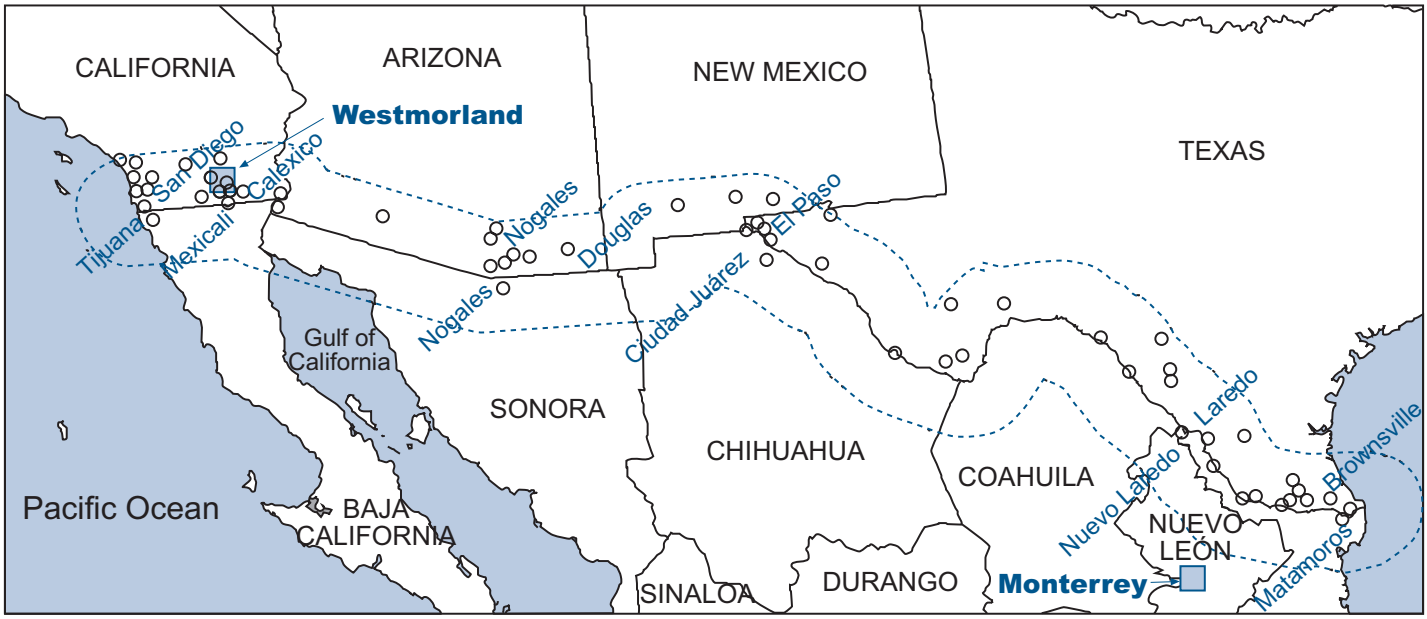
PERMITTED DISPOSAL CAPACITY FOR HAZARDOUS AND SOLID WASTE IN THE BORDER REGION — RESPONSE

There are five sanitary landfills in operation in Mexico's border region (located in Tijuana, Nogales, Ciudad Juárez, Nuevo Laredo, and Matamoros) for the permanent disposal of municipal solid wastes. In the United States, there are 27 municipal solid waste landfills in Texas, 10 in Arizona, 18 in California, and 4 in New Mexico.

Currently, there is only a single site in Mexico for the final disposal of hazardous wastes, located in Monterrey, Nuevo León. Mexico has no permitted disposal capacity in the entire border region. This indicates a lack of infrastructure to support the final disposal of hazardous waste.

The U.S. border region has one commercial disposal site, located in Westmorland, California. However, on a national level, the United States has a surplus of hazardous waste disposal capacity.

Hazardous and Solid Waste Disposal Facilities in the U.S. - Mexico Border Area



The Growth of Maquiladoras

The pace of industrialization and population growth in the border region is most clearly illustrated by the growth of the maquiladora industry.

Maquiladoras are assembly plants that import raw materials into Mexico and assemble finished products, primarily for export.

According to Mexico's National Institute for Statistics, Geography and Information (INEGI), in January of 1993 there were 2,078 maquiladoras in Mexico. By January of 1999, that figure had risen over 50 percent, to a total of 3,143 maquiladoras in all of Mexico. The significance of this growth for border hazardous and solid waste issues is particularly great, given that approximately 80 percent of maquiladoras are located in the border states.

WATER

The indicators developed by the Water Workgroup were developed to help measure progress towards alleviating water pollution problems through the development of needed wastewater and potable water infrastructure, and progress towards improving surface and sub-surface water quality. Two indicators are presented below.

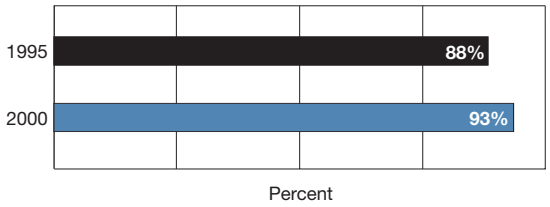
Unreliable water supply and water pollution are persistent environmental and public health problems in the border region. Insufficient wastewater treatment, disposal of untreated discharges, and inadequate operation and maintenance of treatment plants endanger the health of the border communities.

PERCENTAGE OF POPULATION BEING SERVED POTABLE WATER — STATE

This indicator identifies the percentage of the border population that is served drinking water from a central system, and is intended to help assess the effectiveness of current and planned infrastructure projects.

The data is expressed as the percent of households with potable water service. Because most water service infrastructure projects are in the pre-project data collection, project planning, or construction stage, there is a limited database from which to draw present indicator information. It is expected that these in-progress infrastructure projects will result in significant changes in environmental indicators in the near future.

Percent of Mexican Border Population with Potable Drinking Water



WATER QUALITY OF TRANSBOUNDARY SURFACE WATERS — STATE

Federal, state, and local agencies in Mexico and the United States conduct water quality monitoring programs in the border region. The programs have diverse goals, measure different types of water quality characteristics, and have independent sampling schedules and different data quality objectives. The water quality trends for the principal water bodies in the border region can be found in Appendix 14 of the Progress Report. The water quality data was collected and analyzed over a ten-year period from 1987 to 1997 for several water sheds in the border region. Two of the parameters, turbidity and fecal coliform, are presented below.

Turbidity and Fecal Coliform

Turbidity is an indirect measurement of the amount of particles in a water sample. River water and other water bodies have varying turbidity, depending on the type of rock, sediment, or habitat through which they flow. Decaying organic matter and microscopic organisms, such as plankton and bacteria, also increase turbidity. Data for turbidity were collected at 13 locations. As presented below, turbidity is increasing at one site (Rio Grande at El Paso, Texas) and decreasing at three other sites.

Fecal coliform is a measurement of a type of bacteria found in vertebrate gut. It is an indirect measurement of the potential for the presence of human pathogenic bacteria. Data for fecal coliform were collected at 14 locations. The chart below shows that fecal coliform is increasing at one site (New River at the international border) and decreasing at two other sites.

Concentration Trends for Turbidity and Fecal Coliform

CONSTITUENT	SITES WHERE CONCENTRATIONS ARE INCREASING	SITES WHERE CONCENTRATIONS ARE DECREASING	SITES WITH NO CHANGE
TURBIDITY	1	3	9
FECAL COLIFORM	1	2	11

Data are based on monitoring conducted between 1987 and 1997.

All of the Border XXI Workgroups and the comprehensive list of indicators for each workgroup can be found in the U.S.-Mexico Border XXI Program: Progress Report 1996–2000

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Summary of Selected Environmental Indicators

FROM THE U.S.-MEXICO BORDER XXI PROGRAM: PROGRESS REPORT 1996–2000

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Border XXI publications can also be viewed on the Border XXI website: http://www.epa.gov/usmexicoborder/
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